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TELECOMMUNICATIONS
ENGINEER
CHARLES F. TURNER

*NOT ADMITTED IN D.C.
*RESIDENT BRUSSELS

WRITER'S DIRECT DIAL NUMBER

(202) 434-4136

September 21, 1994

RECEIVED

SEP 21 1994

DOCKET FILE COPY ORIGINAL

Mr. William F. Caton

Acting Secretary

Federal Communications Commission
1919 M Street, N.W.

Room 222

Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

VIA HAND DELIVERY

Re: In the Matter of Amendment of Part 15 of the
Rules With Regard to the Operation of Spread
Spectrum Antennas,
Petition for Rule Making and Request for
Immediate Waiver by Western Multiplex Corporation,
RM-8435;

FCC ET Docket No. 94-32,
Notice of Inquiry,
Allocation of Spectrum Below 5 GHz Transferred
from Federal Government Use

Ex Parte Presentation

Dear Mr. Caton:

Pursuant to Section 1.1206(a)(2) of the Commission's rules,
as adopted in the Report and Order in Gen. Docket No. 86-225,
2 FCC Rcd. 3011 (1987), enclosed are copies of the position paper
distributed by the Western Multiplex Corporation in ex parte
meetings held on September 21, 1994 concerning the above-
captioned matters. Mr. Mike Mulcay of the Western Multiplex
Corporation met, along with myself, Charles Turner and Joseph M.
Sandri, Jr. of this firm, with:

1. Jill Luckett, Special Advisor to the Honorable
Commissioner Rachelle B. Chong;
2. Richard Smith, Chief of the Office of Engineering and
Technology ("OET"); Steven S. Kaminer, OET Legal
Counsel; and John A. Reed, OET Technical Standards
Branch; and

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Mr. William F. Caton
September 21, 1994
Page 2

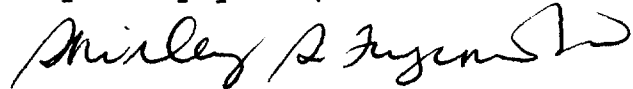
KELLER AND HECKMAN

3. James Coltharp, Office of Commissioner Andrew C. Barrett.

The Commission may refer to both the attachment and the public record for the positions taken by Western Multiplex Corporation.

Kindly place this letter in the public file. Should you have any comments or questions, please do not hesitate to contact the undersigned.

Very truly yours,



Shirley S. Fujimoto
Attorney for
Western Multiplex Corporation

Enclosure

cc: Jill Lockett
Richard Smith
James Coltharp
Steven Kaminer
John Reed



WESTERN[®]
MULTIPLEX
CORPORATION

Spread-Spectrum T1 Digital Microwave Radio

- No license required
- Full T1 capacity digital radio
- Unlicensed operation- under FCC Rules, Part 15.247
- Local area transport applications
- DSX-1 interface, fully transparent
- Up to 1W transmitter RF output
- -90 dBm receiver threshold
- Rugged direct sequence QPSK modulation
- Frequency agile transmitter and receiver



The LYNX Radio is a unique digital microwave radio that uses "spread spectrum" technology. Operating under Part 15.247 of the FCC rules, the radio transmitter requires no user license because of its very low power density spectrum.

Low power density is achieved using direct-sequence, spread-spectrum (DSSS) coding. The rugged receiver uses the coding to produce a high processing gain that provides high protection against interference.

The high transmitter output power (1W max) and sensitive receiver threshold (-90 dBm) give an excellent system gain. As a result, the radio can operate reliably over long paths or in the presence of strong interfering signals.

The LYNX Radio transports a full T1 digital signal transparently and its digital interface meets all applicable DSX-1 standards.

Since no transmitter license is required, a point-to-point LYNX radio link can be quickly installed without time-consuming and expensive frequency coordination.

Compact, economical and user-friendly, the LYNX radio is designed to be very easy to install and operate. A comprehensive selection of test points, indicators, and alarms supply concise system information.

Spread-Spectrum T1 Digital Microwave Radio

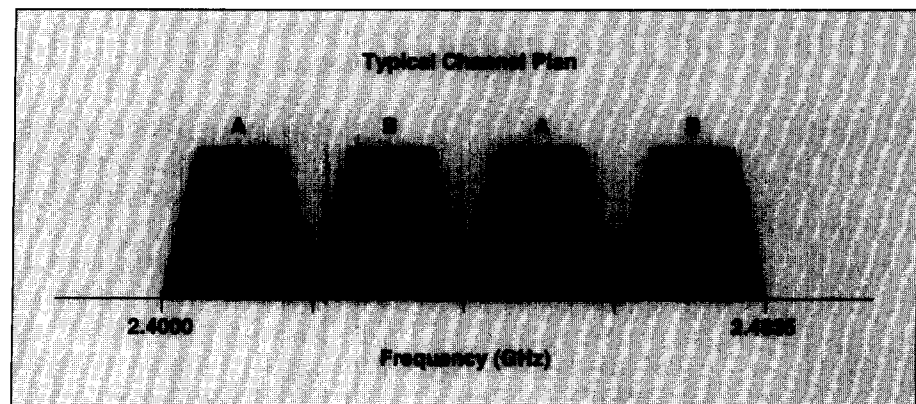
Spread Spectrum Technology

Spread spectrum is a digital coding technique originally developed for the military. The coding operation increases the number of bits transmitted and expands the transmitted bandwidth. This technique provides resistance to jamming, interference, multipath and interception, and minimizes interference to other users. The two main implementations of spread spectrum are frequency hopping and direct sequence.

In frequency hopping systems, the carrier frequencies of the transmitter abruptly change (hop) in accordance with a pseudo-random pattern (chip sequence). The receiver tracks these changes and produces a constant IF signal. Interfering signals are not tracked. Therefore, they only occasionally fall within the IF bandwidth of the receiver.

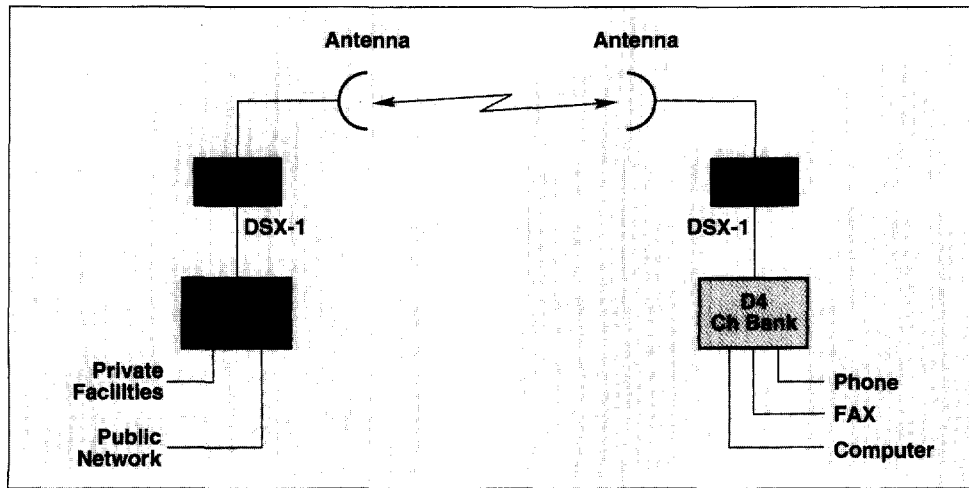
In a direct sequence system as used in the LYNX radio, the digital information signal is multiplied by a rapidly switched sequence of carrier phase variations (chip sequence). In addition, the direct sequence signal bandwidth is significantly expanded beyond the original information bandwidth. At the receiver, the information signal is recovered by remultiplying with a locally generated replica of the transmitted pseudo-random chip sequence. However, interfering signals are subjected to only the one multiplication process in the receiver. The interference is thus increased (or spread) to at least the bandwidth of the chip waveform and is then removed by filtering.

The amount of spreading is dependent upon the ratio of chips to each bit of information. Also, the same sequence (or code) must be used in the transmitter and the receiver in order to recover the information.

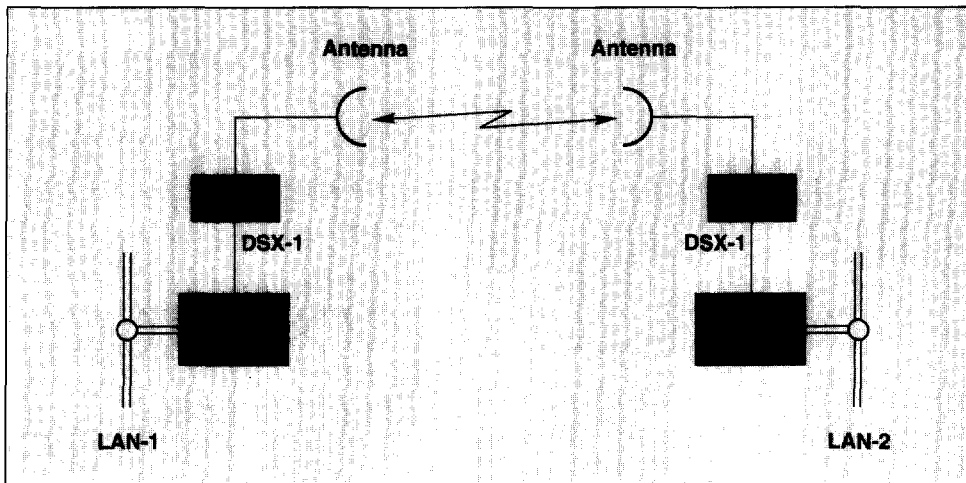


Interference Rejection

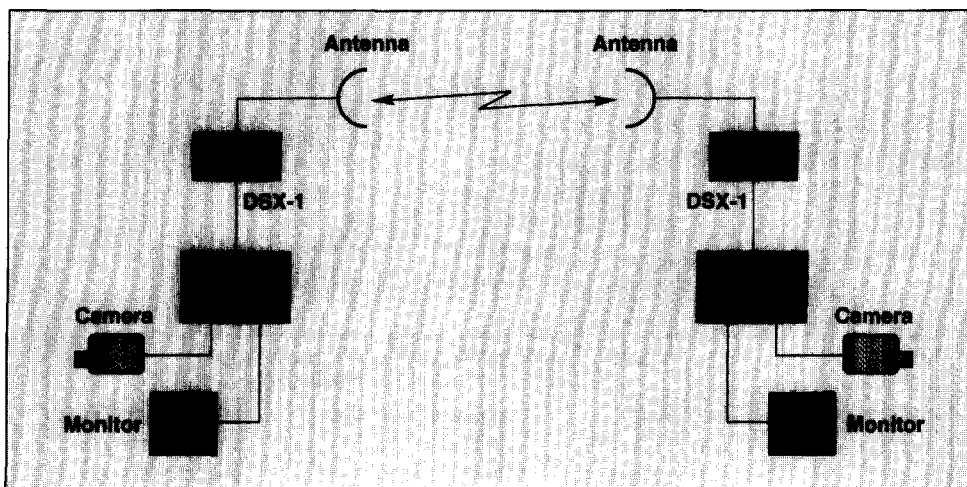
By combining antenna discrimination, code discrimination, and RF channel separation, the LYNX radio system allows multiple users to set up highly reliable digital transmission links within a given geographic area. Shorter path lengths allow even more users to share a common area without interference.



Telephone System



LAN Interconnect System



Video Conferencing System

System

Single Hop Performance:

System Gain	118 dB nom
BER Non-faded	$<10^{-9}$
Acquisition Time	200 msec, max
Transmission Delay	50 μ sec, max (radio only) 100 μ sec, max (10 mile path) 200 μ sec, max (30 mile path)

Channel Plan (Std)

Pair A	2.410 GHz / 2.453 GHz
Pair B	2.430 GHz / 2.473 GHz

Transmitter

Output Power	1W max at antenna port (+28 dBm nom, +27 dBm min)
Spurious/Harmonics	-65 dBc
Frequency Range	2.4 - 2.4835 GHz
Frequency Selection	Synthesizer DIP switch
Increments	100 kHz
IF Frequency	70 MHz
Modulation	QPSK
Coding	Direct sequence
Code Length	127 bits
Spreading Rate	16 times

Antenna/Duplexer

Antenna	2, 4, 6 foot parabolic recommended
Mechanics	External antenna, Antenna Coupling Unit integral to shelf
Antenna Port	N-type female connector
Impedance	50 ohms
Return Loss	17 dB minimum
Frequency Spacing	43 MHz T-R (std)
RF Filter Type	7 cavity

Receiver

Noise Figure	6 dB max at antenna port
Receive Level	-40 dBm nominal -30 dBm maximum, no errors 0 dBm maximum, no damage -90 dBm threshold (1E-6 BER)
Image Rejection	80 dB minimum
AGC Range	60 dB
Frequency Range	2.4-2.4835 GHz
Frequency Selection	Synthesizer DIP switch
Increments	100 kHz
IF Frequency	70 MHz
Processing Gain	>10 dB

Digital Interface

Digital Capacity	1 x T1
Data Rate	1.544 MB/s
Digital Interface	DSX-1, meets CCITT G.823 AT&T Pub 62411 Bellcore TR-TSY-000499
Connector	15-pin, D-type subminiature female, DTE, or Bantam jacks (2)
Line Code	AMI or B8ZS (strap selectable)
Line Build Out	0-280 feet/280-660 feet

Indicators, Test Points, Alarms

Transmit	LED's	MOD ALM (logic level), XMTR ALM, BPV, DATA LOSS, AIS
	Test Points	VAR (synthesizer varactor voltage), +10V, +5V "B", -19V, +5V, GND
Receive	LED's	EYE (BER threshold), RF LEV, CHIP SYNC LOSS, RCVR ALM
	Test Points	EYE I, EYE Q, CLOCK, AGC I, EYE I AMP, EYE Q AMP, VAR, +10V, +10V "B", +5V, -15V, GND

Temperature and Environment

Meets all specs	0 to +50 deg C
Operational	-10 to +55 deg C
Storage	-40 to +70 deg C
Humidity	95% non-condensing
Altitude	15,000 feet

Power

Input Voltage	-21 to -56 V DC Optional AC power supply
Power Consumption	22 W @ -24V DC, 24W @ -48V DC
Fuse	2A 3AG (fast-blow)
Connectors	Barrier strip, plug-in type

Mechanics

Width	17.2"
Height	3.5"
Depth	15"
Weight	13 lbs

FCC Information

FCC Identifier	HZB-LYNX12
Rule Parts	Part 15.247
Frequency Range	2.4-2.4835 GHz
Output Power	1 Watt max.

All specifications are subject to change without notice.



310 Harbor Blvd. • Belmont, CA 94002 • (415) 592-8832
Telex (VIA RCA) 295114 WESMUX • Fax (415) 592-4249

**Western Multiplex designs and manufactures
quality communications equipment:**

Microwave Radio	Baseband Amplifiers	Pilot Equipment
Frequency Conversion	Baseband Filters	Video Equipment
Frequency Generation	Baseband Bridges	Test Equipment
Protection Systems	Baseband Accessories	Translation Equipment



300 Harbor Boulevard
Belmont, California 94002
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Telex via RCA 295114 WESMUX

SUMMARY

January 4, 1994. Western Multiplex Petition for Rule Making

January 4, 1994. Western Multiplex Request for an Immediate Waiver

February 16, 1994. FCC Public Notice (Report 2000, #41771)

March 20, 1994: Deadline for comments.

Statements received by Western Multiplex
on or before March 20, 1994

Statements in support: 32

Statements in opposition: 0

March 22, 1994
and after:

One statement received in opposition.
One statement proposing the use of the
band 5725-5850MHz for licensed
applications.
One statement regarding out-of-band
emissions.

May 9, 1994

Meeting with FCC staff.

June 23, 1994

Manufacture of equipment terminated as
required under the rules.



300 Harbor Boulevard
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January 4, 1994

Office of the Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Dear Mr. Secretary:

Please find enclosed an original and four copies of our Petition for Rule Making and a Request for an Immediate Waiver.

Sincerely

A handwritten signature in black ink, appearing to read 'John Woods', is written over the typed name.

John Woods

President



300 Harbor Boulevard
Belmont, California 94002
Tel. (415) 592-8832
Fax (415) 592-4249
Telex via RCA 295114 WESMUX

January 4, 1994

Dr. Thomas P. Stanley, Chief
Office of Engineering and Technology
Federal Communications Commission
2025 M Street, N.W., Room 7002
Washington, D.C. 20554

Dear Dr. Stanley:

Please find enclosed a copy of our Petition for Rule Making
and a Request for an Immediate Waiver. The original and four
copies have been filed with the Office of the Secretary.

Sincerely

A handwritten signature in dark ink, appearing to read 'Michael Mulcay', is written over a horizontal line.

Michael Mulcay
Vice President
Business Development

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Amendment of Part 15 of the Rules)
with regard to the operation of) RM- _____
spread spectrum transmitters)
with directional antennas)

To: The Commission

PETITION FOR RULE MAKING

Pursuant to Section 1.401 of the Commission's Rules,
Western Multiplex Corporation (WMC) hereby submits this
Petition for Rule Making (Petition) to amend the second
sentence of Section 15.247(b) of the Commission's Rules as
follows:

Original Wording: "If transmitting antennas of directional
gain greater than 6 dBi are used, the power shall be reduced
by the amount in dB that the directional gain of the antenna
exceeds 6 dBi."

Proposed Wording: "If transmitting antennas of directional
gain greater than 6 dBi are used with equipment operating in
the frequency band 902-928 MHz, the power shall be reduced by
the amount in dB that the directional gain of the antenna
exceeds 6 dBi."

I. Introduction

On June 14, 1990, the Commission amended Parts 2 and 15 of its rules to: facilitate greater flexibility in the design and use of non-licensed spread spectrum systems, significantly increase the potential range of permissible designs and to broaden the opportunities for development and use of this important new technology. As the result of the rulemaking, industry is manufacturing products to meet a wide variety of public convenience and safety needs. A significant new public requirement is for outdoor non-licensed spread spectrum point-to-point communication systems operating in the 2400-2483.5 MHz and 5725-5850 MHz bands. These systems use directional antennas and transmitter output powers of up to 1 Watt. The public need for these important types of systems were unknown and therefore not considered by industry or the Commission in the proceedings of Docket No. 89-354, adopted on June 14, 1990.

II. Directional Antennas

Communication systems for narrow band point-to-multipoint applications have typically used frequencies below 1 GHz, due to the less stringent line-of-sight propagation requirements, lower propagation loss and narrow available bandwidths.

Communication systems for broadband point-to-point applications have typically used frequencies above 2 GHz, due to the line of sight propagation characteristics, wide available bandwidths and the ability to build and install cost effective directional antennas. The use of directional antennas means that in a given area frequencies can be reused to yield a significantly higher transmission capacity per unit bandwidth than can be achieved with non-directional antennas.

For these reasons WMC believes that in the frequency bands 2400-2483.5 MHz and 5725-5850 MHz systems that use directional antennas should not be penalized with a transmitter power requirement lower than the transmitter power allowed for less spectrum efficient systems using omnidirectional antennas.

III. Demonstrated Public Need

WMC is a manufacturer of point-to-point spread spectrum microwave radios in the frequency bands 2400-2483.5 MHz and 5725-5850 MHz under rule section 15.247 and the transition provisions of rule section 15.37. The transition provisions permit the use of antennas having directional gains greater than 6 dBi without reducing the transmitter power below the allowed 1W maximum. A widespread public need for these systems is clearly demonstrated by the sale and use of these products throughout the United States. Users include: manufacturing and service companies, oil and gas pipeline companies, power utility companies, railroads, cellular radio companies, mobile and SMR operators, common carriers, public safety, state and local governments and the federal government.

IV. In the Public Interest

WMC believes that this Petition is in the public interest for the following reasons:

1. The requirement that the transmitter power for systems operating in the 2400-2483.5 MHz and 5725-5850 MHz bands be reduced by an amount in dB that the directional gain of the antenna exceeds 6 dBi would damage the public interest by severely limiting the effective operation of systems manufactured for outdoor applications.
2. After June 22, 1994, members of the public who had been able to obtain equipment under the transition rules of section 15.37, will be forced to seek the use of alternative, licensed, equipment. This will add congestion to the licensed spectrum and tax the FCC's already limited resources.
3. The public would benefit from being able to continue to obtain non-licensed products that can be swiftly installed in a wide variety of point-to-point applications. Elimination of these products would needlessly subject the public to the delay and significant expense of frequency coordination required with the use of licensed equipment.

4. Industry will be able to respond to the needs of the market with a wider variety of emerging technology products and capabilities.
5. The granting of this petition will enhance the FCC's goal of significantly increasing the potential range of permissible designs for Part 15 spread spectrum systems and broadening the opportunities for the development and use of this important new technology.
6. If the petition is not granted, products that are clearly being used to meet a wide variety of public convenience and safety needs will be forced off the market.
7. If the petition is not granted, successful U.S. businesses will be harmed during economically challenging times.

V. No Known Case of Harmful Interference

Equipment using directional antennas without the 6 dBW EIRP restriction now operates throughout the United States. There are no cases of harmful interference in either the 2400-2483.5 MHz or 5725-5850 MHz bands known to WMC.

WHEREFORE, THE PREMISES CONSIDERED, Western Multiplex Corporation respectfully requests the Commission to initiate a rulemaking proceeding consistent with the views expressed herein.

Respectfully submitted,

WESTERN MULTIPLEX CORPORATION

By:

A handwritten signature in dark ink, appearing to read "J. Woods", is written over a horizontal line.

John Woods
President

Western Multiplex Corporation
300 Harbor Boulevard
Belmont, CA 94002

(415) 592-8832

January 4, 1994

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Request for an Immediate Waiver
of Part 15 of the Rules with
regard to the operation of
spread spectrum transmitters
with directional antennas

To: The Commission

REQUEST FOR AN IMMEDIATE WAIVER

Pursuant to Section 1.401 of the Commission's Rules,
Western Multiplex Corporation (WMC) hereby submits this
Request for an immediate waiver (Request) of the second
sentence of Section 15.247(b) of the Commission's Rules for
our spread spectrum radios, FCC Identifiers HZB-LYNX12 and
HZB-LYNX16, while our Petition for Rule Making, dated January
4, 1994, is in process.

I. Demonstrated Public Need

WMC is a manufacturer of point-to-point spread spectrum microwave radios in the frequency bands 2400-2483.5 MHz and 5725-5850 MHz under rule section 15.247 and the transition provisions of rule section 15.37. The transition provisions permit the use of antennas having directional gains greater than 6 dBi without reducing the transmitter power below 1W maximum. WMC has demonstrated that there is clearly a widespread public need for these types of systems as a result of the sale and use of these products throughout the United States. Users include: manufacturing and service companies, oil and gas pipeline companies, power utility companies, railroads, cellular radio companies, mobile and SMR operators, common carriers, public safety, state and local governments and the federal government.

II. In the Public Interest

WMC believes that this Request is in the public interest for the following reasons:

1. After June 22, 1994, members of the public who had been able to obtain equipment under the transition rules of section 15.37, will be forced to seek the use of alternative, licensed equipment. This will add congestion to the licensed spectrum, tax the FCC's already limited resources and defeat the purpose of non-licensed operation.
2. The public would benefit from being able to continue to obtain non-licensed products that can be swiftly installed in a wide variety of point-to-point applications. Elimination of these products would needlessly subject the public to the delay and significant expense of frequency coordination required with the use of licensed equipment.
3. If the Request is not granted, products that are clearly being used to meet a wide variety of public convenience and safety needs will be forced off the market.

4. Granting of the Request will enhance the FCC's goal of significantly increasing the potential range of permissible designs for Part 15 spread spectrum systems and broadening the opportunities for the development and use of this important new technology.
5. It will prevent harming a successful U.S. business during economically challenging times.

III. No Known Case of Harmful Interference

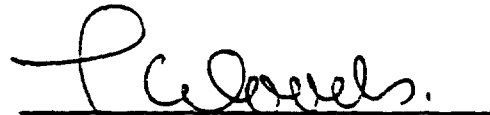
Equipment using directional antennas without the 6 dBW EIRP restriction now operates throughout the United States. There are no cases of harmful interference in either the 2400-2483.5 MHz or 5725-5850 MHz bands known to WMC.

WHEREFORE, THE PREMISES CONSIDERED, Western Multiplex Corporation respectfully requests the Commission to grant an immediate waiver of the second sentence of section 15.247(b) of the rules for our radio equipment, FCC Identifier HZB-LYNX12 and HZB-LYNX16, while our Petition for Rule Making is in process.

Respectfully submitted,

WESTERN MULTIPLEX CORPORATION

By:


John Woods
President

Western Multiplex Corporation
300 Harbor Boulevard
Belmont, CA 94002

(415) 592-8832

January 4, 1994

Appendix A - REQUEST FOR AN IMMEDIATE WAIVER
FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20434

GRANT OF EQUIPMENT AUTHORIZATION

Certification

Western Multiplex Corporation
310 Harbor Boulevard
Belmont, CA 94002

Date of Grant: June 8, 1992
File No.: 31010/EQU 4-3-2
Application dated: February 24, 1992

Attention: Mr. John Woods, President

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for
the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER

Name of Grantee

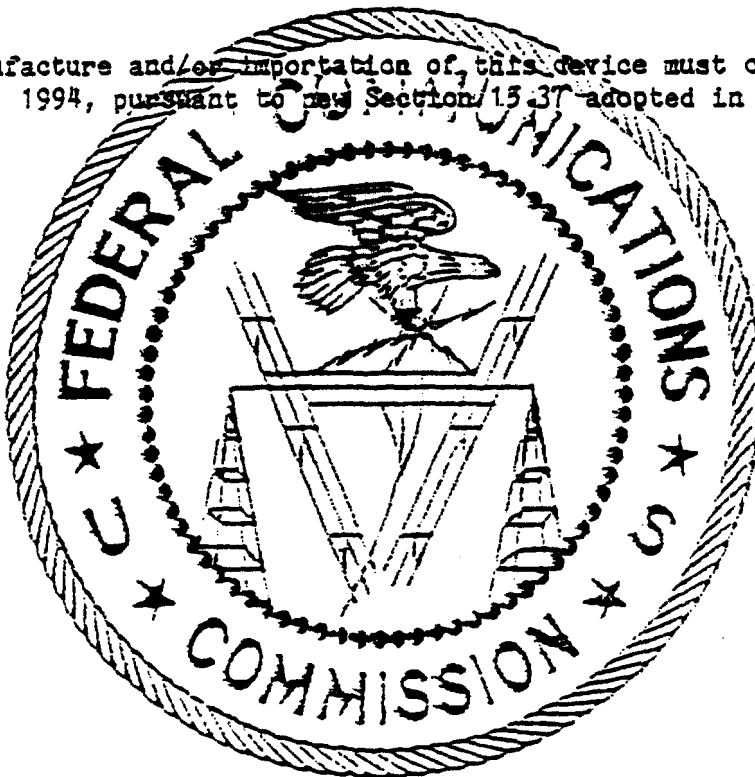


FCC Rule Part(s): 15

Frequency (MHz) : 2400-2483.5

Equipment Class : Spread Spectrum Transmitter

The manufacture and/or importation of this device must cease on
June 23, 1994, pursuant to new Section 15.37 adopted in Docket 87-389.



Appendix B - REQUEST FOR AN IMMEDIATE WAIVER.
FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20534

GRANT OF EQUIPMENT AUTHORIZATION

Certification

Western Multiplex Corporation
310 Harbor Boulevard
Belmont, CA 94002

Date of Grant: August 5, 1992
File No.: 31010/EQU 4-3-2
Application dated: June 19, 1992

Attention: John Woods

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for
the equipment identified herein for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER

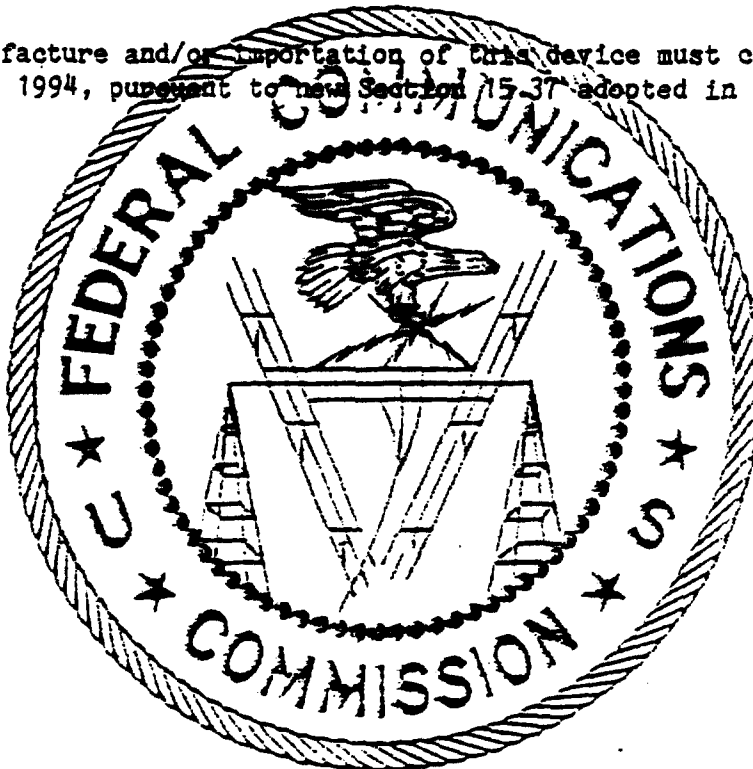
Name of Grantee

FCC Rule Part(s): 15

Frequency (MHz) : 5735-5840

Equipment Class : Spread Spectrum Transmitter

The manufacture and/or importation of this device must cease on
June 23, 1994, pursuant to new Section 15.37 adopted in Docket 87-389.





300 Harbor Boulevard
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TO: Tom Stanley (202 632 0199) ✓
Juli Knapp (301 344 2050)
Rick Engleman (202 653 8773)
John Reed (202 653 8773)

CO: FCC

FROM: Mike Mulcay

SUBJECT: Meeting of May 5th., re RM-8435.

DATE: May 9, 1994

Gentlemen:

Following last Thursdays meeting I did a little research on some of the topics that we discussed.

1. In support of cellular systems

Over 50% of the applications of Western Multiplex spread spectrum radios, that operate with directional antennas under the existing rules, are used to support cellular systems.

2. Cost effective alternative to copper or fiber

Spread spectrum radios using directional antennas have been proven to be a cost effective alternative to copper or fiber systems. Example: For a 20 mile rural transmission span line, the cost of a Part 15 spread spectrum radio system, using directional antennas under the existing rules, is approximately 1/20 the cost of a direct buried cable system.

3. Operating Distance

3.1 WMC believes that the average path length is 20 miles.

3.2 The new rules, post June 22nd 1994, will reduce the system operating distance by up to 70% and the service area coverage by up to 90%, thereby forcing products that satisfy a wide variety of public convenience and safety needs from the market.